HEARING CONSERVATION PROGRAM

HEARING PROTECTION

Learning Objectives

1. List the considerations used to select hearing protection devices (HPD)
2. Identify and describe the major types of HPDs
3. Compare the advantages and disadvantages of each type of HPD
4. Demonstrate proper HPD fitting on self and others
5. Explain the effect of HPDs on speech understanding for normal and impaired hearing

Situations Requiring Hearing Protection

- A noise hazard is present
- Hazard or danger signs indicate noise hazards
- Noise levels are
  - ≥ 85 dBA Continuous Noise
  - > 96 dBA Double HPD
  - ≥ 140 dBP Impulse Noise

HPD Noise Reduction Ratings

Advertised Attenuation in dBC	≠	IH Measured Attenuation in dBA

Advertised NRR dB C = 25 dBC HL

Noise Level dB = 100 dBA HL

NRR Attenuated Level = 75 dBA HL

NO!

Real World Attenuation = 87 dBA HL

YES!

Real World NRR (dBA) is approximately ½ the advertised NRR (dBC) value

Selection Considerations for HPD

Selection criteria

- Work environment
- Job requirements (pilot vs mechanic)
- Attenuation needed & NRR value of device
- Advantages & disadvantages of device
- Communication needs
- Safety needs
- Personal choice & comfort

Other Selection Considerations

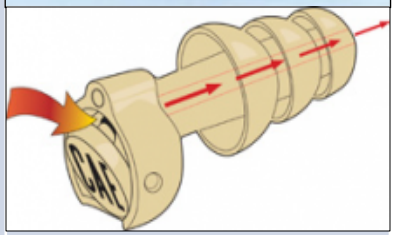
- **Double protection needs**
  - → **Not additive**
  - → **Second HPD provides only 5-6 dB additional attenuation**
  - → **Don't overprotect (safety threat)**
- **Cost effectiveness for purpose of use**
- **Administrative controls required when HPDs cannot reduce noise below 85dBA**

Approved Types of HPDs

Any HPD tested by DoD or NMCPHC approved lab is acceptable

- **Earplugs**
  - **Pre-formed**
  - **Hand-formed**
- **Noise Muffs – all authorized (w/o radios)**
- **Ear Canal Caps**
- **Helmets**

Pre-formed Earplugs

Type	NRR	Sizes	Fit	Exampl
Single Flange	25 dB	5 color coded ex small to ex large	Tab points to back of ear	
Triple Flange	26 dB	3 color coded Small - Med - Large	Stick only should show	
Quad Flange	25 dB	Universal fit One size	Stick only should show	
Combat Ear Plug	22+ dB	3 Sizes	Inserted	

NRR -- Noise Reduction Rating

Advantages of Pre-Formed Earplugs

- Effective protection
- Durable – can be rewashed/reused
- Easily carried – earplug carrying case
- Inexpensive
- Fairly comfortable

Disadvantages of Pre-formed Earplugs

- Requires individual medical fitting of both ears
- Frequent insertion may cause irritation
- Works loose with jaw movement
- Improper fit reduces effectiveness

Hand-formed Earplugs
"foamies"

Type	NRR	Sizes	Fit	
Sound Guard EAR Classic EAR Classic 30 EAR Classic 33	29-33 dB 29-33 dB 29-33 dB 29-33 dB	Medium Size Small Size Large Size	No color should show when viewed directly in front	

Advantages of Hand-Formed Earplugs

- Effective protection
- Comfortable -- Universal fit
- Medical fitting not required
- One time use – hygienic
- Good choice when hat or helmet required
- Least expensive HPD

Disadvantages of Hand-formed Earplugs

- Must be properly molded
- Must be properly inserted
- One-time use
- Should use clean hands
- Do not use in presence of corrosives

Other Approved Types of HPDs

Type	NRR	Sizes	Fit	Example
Noise Muffs or Circumaural Headset	**25-35 dB**	**Varies with type**	▪ **Seal firmly around pinna** ▪ **Headband worn top of head** ▪ **Type II allows headband placement top or behind head or under chin**	
Ear Canal Caps	**18 dB Varies**	**One Size**	▪ **Inserted tightly into ear canal opening** ▪ **Headband placed on top or behind head, or under chin**	
Helmets			**For specific**	

Advantages of Circumaural Noise Muffs

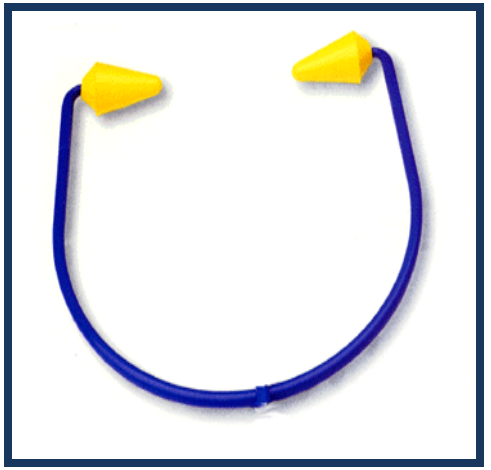
- **Good attenuation -- protection**
- **Universal fit**
- **Can be worn with earplugs**
  - → **double protection provides 30+ dB of attenuation**
- **Can incorporate other equipment**
  - → **communications equipment Active Noise Reduction (ANR)**
- **Medical fit not required**

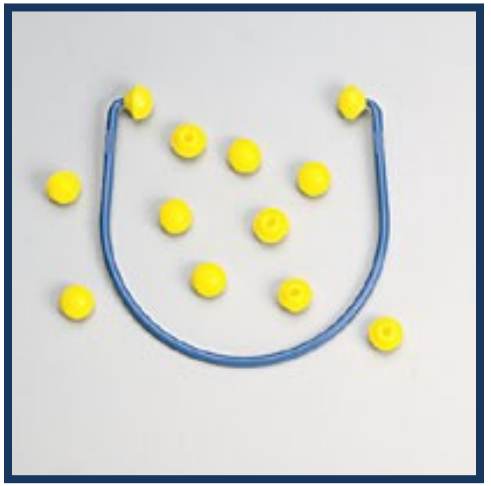
Disadvantages of Circumaural Noise Muffs

- Most expensive type of HPD
- Bulky and heavy
- Uncomfortable in heat and humidity
- Effectiveness may decrease with hair, eyeglasses and earrings
- Not easily carried

Advantages of Ear Canal Caps

- Quickly inserted without soiling
- Medical fit not required
- Easily carried, light weight
- Universal fit – one size fits all
- Best for intermittent noise of moderate intensity (95 dBHL or less)





Disadvantages of Ear Canal Caps

- More expensive than earplugs
- Uncomfortable during extended use
- Very limited attenuation
- Poor headband tension easily reduces attenuation

Helmets

Integrated and Specialized HPD's

- **Aviators, Aviation Crew**
- **Flight & Well Deck Personne**
- **Tank Crews**
- **Amphibious Assault Vehic Crew Members**

Care and Maintenance of HPDs

PRE-FORMED EARPLUGS

- **Clean after each use with warm soapy water**
- **Rinse & dry completely before re-use**
- **Avoid inserting with soiled hands**
- **Get new pair when condition no longer provides good fit**

HAND-FORMED EARPLUGS

- **Made for one time use**
- **Avoid inserting with soiled hands**
- **Never use if contaminated with metal filings or corrosives**

Care and Maintenance of HPDs cont…

NOISE MUFFS

- Wipe down ear cups with alcohol-free cloth
- Check for ear cup defects/deformities
- Replace cushions when cracked or broken
- Check headband tension
- Modification of muffs

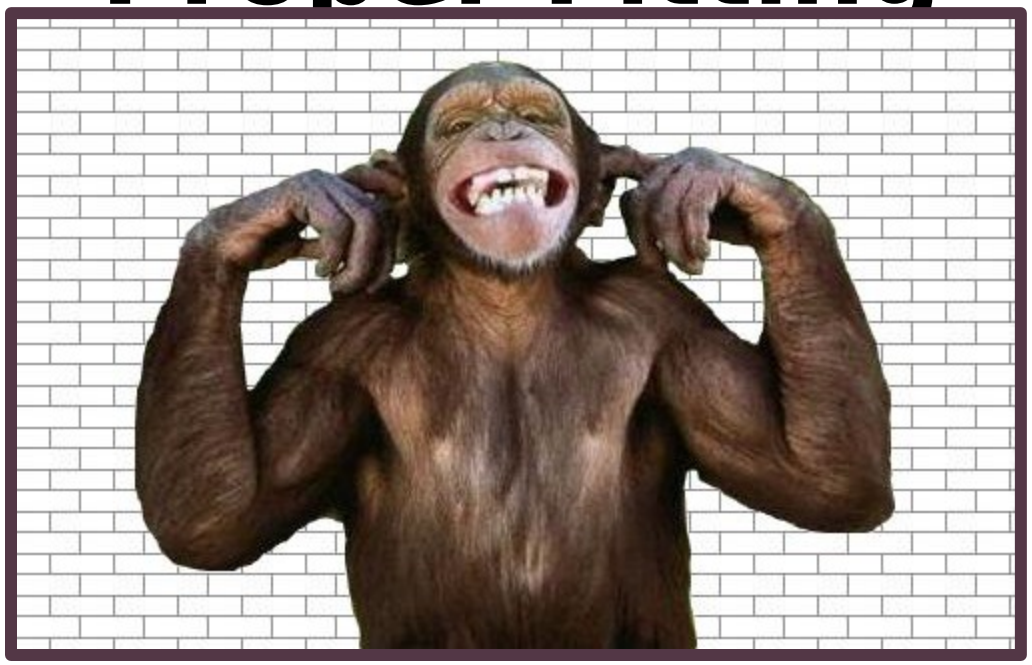
EAR CANAL CAPS

- Clean similarly to preformed HPD
- Check headband tension
- Replace when ear tips become hard

Noise Reduction Ratings

and

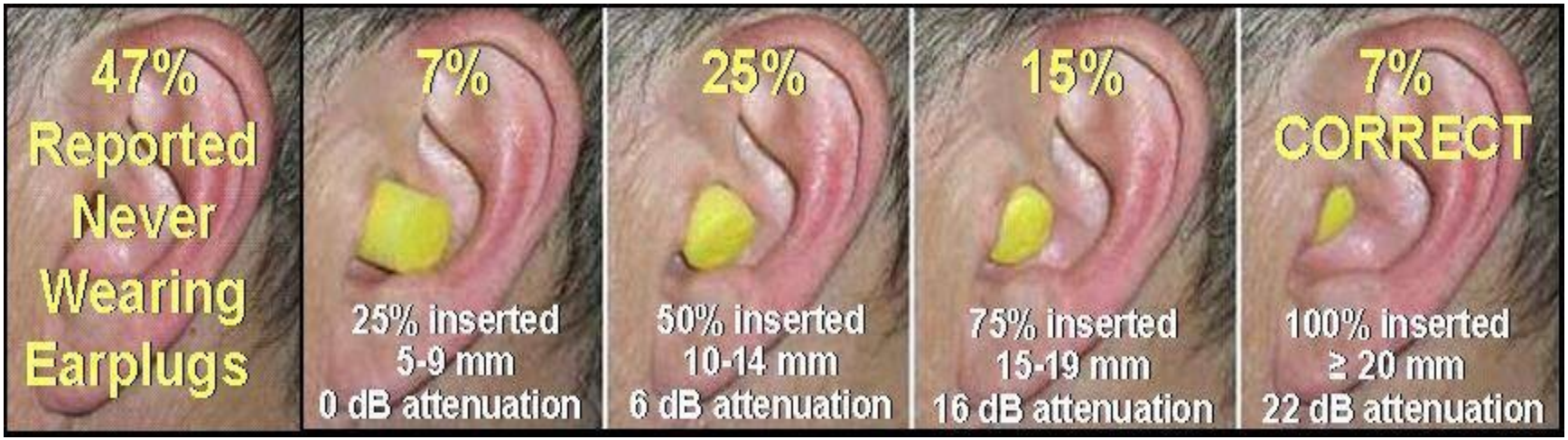
Proper Fitting



Real-World Hearing Protection

Interviewed 300 Flight Deck Crews from 4 CVN and 2 LHD / East and West Coast

79% **Received an estimated 0 - 6 dB noise attenuation due to either shallow earplug insertion or NOT wearing earplugs at all**



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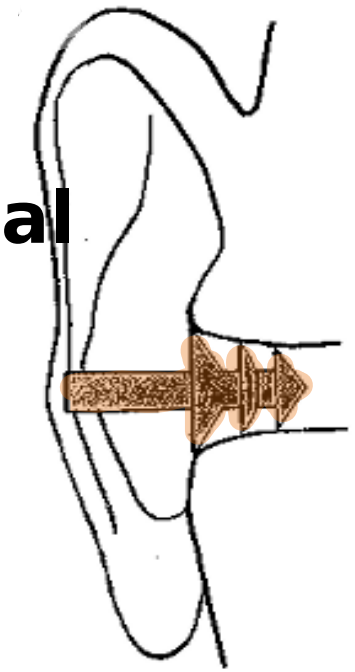
What is a Good Earplug Fitting?

- Voices sound muffled
- No difference in sound when cupped hands are placed over ears and then removed
- Vacuum effect when tug on the earplug
- Comfortable – non-irritating
- Each ear is fit individually
- Majority or all of plug is not visible when directly looking at user
- Single flange tab toward rear of head

Insertion of Pre-formed Earplug

1. Grasp plug firmly behind largest flange
2. Insert smaller flange in ear canal
3. Push and jiggle toward rear or center of head
4. If a good seal is not obtained, use smaller or larger size
5. Only stick should be seen when looking directly into mirror; last flange should be flush with ear canal



Insertion of Hand-formed Earplug

1. Roll earplug between thumb and index finger to make very thin tube
2. Ensure there are no creases in rolled plug
3. Pull up and back on ear
4. Insert earplug as DEEPLY as possible
5. All color should be in ear canal

Practice #1 – Good or Bad Fit?

1

2

Practice #2 – Good or Bad Fit?

1

2

Practice #3 – Good or Bad Fit?

1

2

Practice #4 – Good or Bad Fit?

1

2

30

Practice #5 – Good or Bad Fit?

1

2

"But I Can't Wear My Hearing Protection Because…

- They hurt or itch my ears!
- My ears will become infected!
- I can't hear the engine sounds!
- I need to get used to how loud my weapon is!
- I won't be safe if I can't hear live fire or my equipment operating!

Flawed logic! Thinking short-term vs. long-term!

Bottom line: Is your hearing worth protecting?

Effects of HPDs on Hearing Performance

Lombard & Occlusion Effects

People will speak at a level that overcomes effects of noise and HPD attenuation

Result is good communication over wide range of conditions

Hearing Ability

Effective communication performance requires practice using HPD's consistently

Listeners with hearing loss may have problems understanding speech in high levels of noise

Specialized HPDs

- **Custom earmolds or earplugs**
- **Musician hearing protection**
- **Communication earplugs & headsets**

Details following . . .

Custom Earmolds or Plugs

- Made of silicone material
- Made by audiologist or trained personnel with supervision
- Hardened mold is sent to lab for final customized molds
- NRR varies but excellent
- Expensive
- Most often used by pilots

Musician Hearing Protection

Devices designed specifically for musicians and sound engineers

Medically fit

Custom ear molds made for each individual

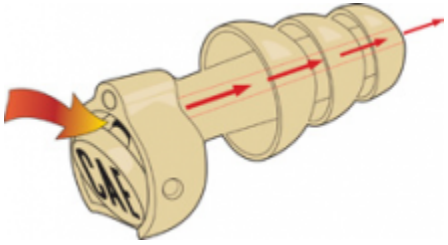
NRR = 15-25 dB

Communication HPD: Combat

Mechanical

2nd Generation

3rd Generation



4th Generation

Electrical

Communication HPD: Headsets

Electronic active ear muffs

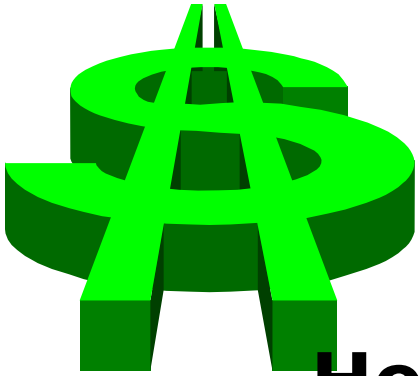
- **good passive reduction**
- **has microphone**
- **has small loudspeaker inside the cup**

Attenuates constant and impulse noises

Can be attached to radios for distance communication

Communication HPD: Electrical

- **Electrical devices provide both communication and protection capability**
- **Earplug designed with small speaker insert**
- **Capable of long range radio communications**



Funding for HPDs

Hearing protection must be issued

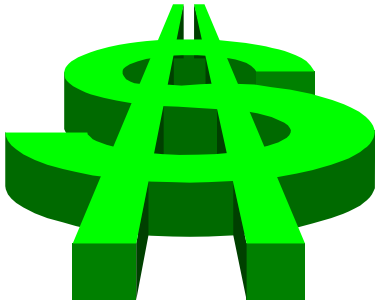
- **no cost to the employee**
- **must be replaced if lost, damaged or poorly fit**

WHO BUYS?

AFLOAT

Initial HPDs – Ship's Medical
All other HPDs – Department

ASHORE – Command Safety



More Funding Details

Personnel in the HCP have the right to choose which type of HPD they prefer to wear

HPD must be among approved selections

Customized ear molds available upon request with adequate funding

SUMMARY

The Best Hearing Protection

Is The One

You Use

Consistently And Correctly

QUESTIONS?